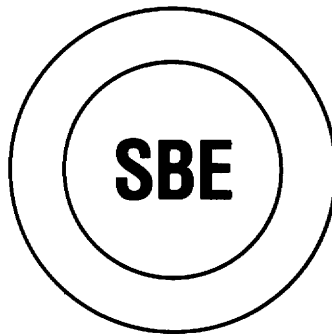


**Comments of the
Society of Broadcast Engineers, Inc.**

**IB Docket 01-185
(Terrestrial MSS)**



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SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
Terrestrial MSS Operations for the)	IB Docket No. 01-185
Mobile Satellite Service)	
)	ET Docket No. 95-18
)	

To: The Commission

Comments of the Society of Broadcast Engineers, Inc.

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, with more than 5,000 members world wide, hereby respectfully submits its comments in the above-captioned notice of proposed rulemaking ("NPRM") relating to allowing a terrestrial component to be added to Mobile Satellite Service ("MSS") operations.

I. There Is No Need To Allow Terrestrial MSS

1. First, SBE feels compelled to point out that there is no need to allow MSS a terrestrial component. New ICO Global Communications Holdings Limited ("New ICO") acknowledges that MSS telephones cannot provide reliable communications inside large office buildings or even the "urban canyons" found in big cities because of the line-of-site problems to low earth orbit satellites. SBE is forced to remind the Commission that large metro areas in the United States are already well served by cellular and Personal Communication Service ("PCS") carriers. Indeed, it is precisely because cellular and PCS already have in place an extensive network of terrestrial cells that in-building service is now available in all but the smallest communities. Adding a terrestrial component to MSS is tantamount to giving MSS a "free ride" while at the same time letting some of the air out of the tires of existing terrestrial services. SBE suspects the terrestrial component would soon become the "tail wagging the dog."¹ Rather than authorizing a spectrally wasteful duplication of services, the Commission should require MSS to hand off traffic to conventional terrestrial cellular and PCS providers in those already well-served areas where MSS won't work. SBE admits that MSS may have a role to play in covering areas that terrestrial cellular

¹ *Indeed, Paragraph 11 of the NPRM notes that "...a call could originate and terminate on one part of the network (e.g., terrestrial) without being carried on the other part of the network (e.g., satellite)."*

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and PCS cannot, if the marketplace turns out to demonstrate a need for such service. A switching network can allow these two services to complement each other, rather than setting in motion an overlay of economic and technical aspects to an increasingly complex array of services. SBE believes that is not the Commission's job, nor is it in the public interest, to provide a crutch for any commercial venture that cannot stand on its own.

2. SBE believes that this proposal would be unfair to cellular and PCS entities that paid billions of dollars to the U.S. Government for the right to terrestrial cellular and PCS frequencies. SBE notes that in a June 13, 2001, *ex parte* letter to IB Docket 99-81 (MSS Service Rules) on behalf AT&T Wireless Services, Inc., Cingular Wireless LLC, Sprint PCS and Verizon Wireless, those cellular and PCS providers stated that if the FCC finds MSS spectrum suitable for a terrestrial component, Section 309(j) of the Communications Act then requires that the Commission must auction that spectrum use to the highest bidder. This is also a clear indication to SBE that these entities perceive the instant proposal as a devaluation of what they have already paid for at auction.

3. At Paragraph 24 the NPRM raises the claim by New ICO that "without the opportunity to expand the MSS customer base, the future of this service [MSS] is in dire jeopardy." This may or may not be the case, but SBE submits that it is irrelevant. New ICO, and other MSS proponents, knew full well that MSS was a satellite-based service. They also knew full well that there was an extensive infrastructure of terrestrial cellular and PCS sites, providing service in all but the smallest communities. No matter how hard the New ICO tries to bend the laws of physics, "full coverage" from low earth orbit satellites alone is not possible in urban or terrain-challenged areas. Putting lipstick on a pig never changes the inherent nature of the beast. It is inappropriate for the Commission to turn MSS into a hybrid service with a thinly disguised and euphemistically described "flexibility" policy. SBE is surprised that the Commission's economists and lawyers have been so thoroughly bamboozled by this proposal. Hopefully, the comments of the cellular and PCS industries, which SBE sees as the entities with the most to lose if the Commission were to allow a "terrestrial free ride" to MSS, will let their opinions again be heard loud and clear in this instant rulemaking.

4. Should terrestrial MSS nevertheless end up being approved, the FCC proposal to revoke terrestrial authority if the satellite portion goes dark is appropriate but far too weak. SBE suspects that MSS would leave just a few token low earth orbit satellites in orbit, or perhaps just one, depending how closely the Commission would make MSS toe the line, so as to continue to justify their real goal, a terrestrial system serving the lucrative major

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population centers. The Commission must require full and effective satellite coverage of all U.S. land areas as an absolute condition for any terrestrial operational rights. Further, if a terrestrial component for MSS is allowed, each and every such terrestrial facility needs to be individually licensed, as discussed at Paragraph 53 of the NPRM, to ensure *mandated* frequency coordination with the TV Broadcast Auxiliary Service ("BAS").

II. Mandatory Negotiation Period Must Be Placed "On-Hold" or Restarted Pending Completion of this Rulemaking

5. The recent terrorist attacks on the United States have underscored the importance of keeping 2 GHz electronic news gathering ("ENG") TV BAS stations fully operational, and not tied up in a quagmire of uncertainty and differing channel plans. ENG played an important role during the September 11 terrorist attacks and their aftermath in keeping the public, police and fire fighters, and government officials all the way up to the President and Vice President informed of the latest developments.

6. Experts tell SBE that fast, accurate information is a proven tactic to counter fear and terror. Terrorists depend on fear of the unexpected and unknown to support their aims. Broadcasters must be able to do everything in their power to get accurate information to public officials/emergency managers and the public. Disasters and terrorists have impacted public services, utilities and the air transportation infrastructure. This has had the effect of shaking the public's faith in those institutions. The last thing needed are technical changes that will have the effect of extending this loss of confidence to the media.

7. For a period of time on September 11, 2001, the President was out of touch with the national press corps. While this was not an ENG issue on that date, SBE believes that the documented uncertainty that arose in that period of time took days to counter and stands as an important lesson for the future. Like it or not, the Nation has and will experience events where ENG has helped get the President and/or other officials on the air to the benefit of our country. This positive effect of the public seeing the President and other officials on the established networks cannot be overstated. Now more than ever, we need to preserve what the American public perceives to be an integral part of a free and open society, and a free press, namely ENG.

8. SBE therefore believes that the mandatory two-year negotiation period which commenced on September 1, 2000, must be placed "on hold" or restarted pending completion of this IB Docket 01-185 rulemaking and also the related ET Docket 00-258 Further Notice of

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Proposed Rulemaking ("FNPRM") concerning third-generation wireless services ("3G"). The possible creation of a terrestrial MSS system, the possible reassignment of 2,008–2,025 MHz to 3G wireless services, or both, has the potential of changing the rules and the playing field. No broadcaster can be expected to enter into binding negotiations when fundamental issues such as adding a terrestrial component to MSS are being discussed. Likewise, how can broadcasters be expected to enter into binding negotiations if Phase II spectrum clearing will occur far sooner than it might otherwise? The accelerated loss of 2,008–2,025 MHz upon a showing of actual need by MSS would force broadcasters to negotiate with MSS entities that not only have to survive bankruptcy, but also have sufficient subscribers to justify use of another 17 MHz of spectrum. Finally, at this point broadcasters no longer know for sure who will be moving into the 2,008–2,025 "spectrum next door," which makes it difficult to negotiate and difficult to know what adjacent-channel rejection performance new BAS receivers operating on a re-farmed Channel A1 (*i.e.*, 2,025–2,037.4 MHz) will need to have. Based on such sweeping changes, SBE can only predict that the negotiations appropriate for converting to 14.5-MHz analog operations will be significantly different from the negotiations appropriate for converting to 12.1-MHz digital operations. Differing, and additional, hardware requirements are only one dimension of such a new negotiating field. Also, if 3G, or other entities, are to be brought into the mix, the mechanics that will include those additional players in the negotiating process will first need to be established.

9. Similarly, the 10-year sunset period adopted in the ET Docket 95-18 Second Report and Order ("R&O") and Second Memorandum, Opinion and Order ("MO&O") also needs to either be placed on-hold or restarted pending completion of the IB 01-185 and ET 00-258 rulemakings.

10. The Broadcasters 2 GHz ENG Ad Hoc Group has been working for the last six months to establish a "comparable facilities" benchmark between 17 and 14.5 MHz channel spacing, to be used by both broadcasters and MSS. This benchmark is needed to determine if a given radio provides equivalent performance compared to that now possible with 17-MHz wide analog radios with two or more audio subcarriers. SBE estimates that the laboratory testing needed to establish the performance parameters of existing 2 GHz analog ENG radios versus 14.5-MHz wide analog ENG radios will be in the \$350,000 range. But if there will be no Phase I with 14.5-MHz wide channels, or if Phase I will only last months instead of years, then jumping immediately to Phase II and 12.1-MHz wide channels becomes the only practical alternative. If there will be no Phase I period with 14.5-MHz wide channels then the test results for 14.5-MHz wide analog radios versus 17-MHz wide analog radios would

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become irrelevant; since this would be a reimbursable expense, SBE suspects that MSS has no desire to throw away \$350,000.

11. Therefore, broadcasters would be faced with immediate conversion to 12.1 MHz wide channels for the 2 GHz TV BAS band. This, in turn, would mean converting to digitally-modulated radios. While analog operation in 12.1 MHz might be possible with a single audio subcarrier, it is clear that two audio subcarriers will never be possible for 12.1-MHz wide channels. Also, it is obvious that analog split-channel operations would not be remotely possible with 12.1-MHz wide channels. Since going from two or more audio channels to just one audio channel, and the elimination of the option for split-channel operation, clearly will not result in comparable facilities, SBE believes that a plan based on 12.1-MHz wide 2 GHz TV BAS channels means converting to digital modulation. This, in turn, means new transmitters (including the necessary MPEG encoder) in addition to new receivers. Replacement bandpass filters and PCS-reject filters will also be necessary, given the greater sensitivity of digitally-modulated signals to group delay errors, and, of course, the requirement for shifted center frequencies. Much ancillary hardware will also likely require replacement; for example, new Nycoils² because of differing control cable requirements.

12. There is also the matter of the pending September 5, 2001, SBE Petition for Partial Reconsideration of the July 3, 2000, Second R&O and Second MO&O to ET Docket 95-18, wherein SBE requested that the ineligibility for reimbursement be changed from commencing 30 days after publication of the Second R&O in the Federal Register to instead commencing 90 days after the Mass Media Bureau completes a rulemaking³ that allows the routine licensing of digital BAS microwave links.

13. For all of the above reasons, the present negotiating period between broadcasters and MSS needs to be immediately halted, pending the outcomes of this instant rulemaking and the companion ET Docket 00-258 FNPRM.

² "Nycoil" refers to the manufacturer of the coiled, flexible tubing on the outside of ENG truck masts than contains the necessary interconnecting cables between the hardware at the top of the mast and electronics inside the ENG truck, without binding as the mast is raised and lowered.

³ Namely, ET Docket 01-75 (Updating of the Part 74 BAS Rules).

III. The Commission Must Not Back Down from Its ET Docket 95-18 Ruling that the Newcomer Service Must Provide Broadcasters with Equivalently Performing Systems in a Narrowed 2,025–2,110 MHz TV BAS Band

14. In the Second R&O/MO&O to ET Docket 95-18, the Commission unequivocally applied the emerging technologies policy that a newcomer service needing spectrum with incumbent users must provide equivalently performing facilities to the incumbents in their new spectrum. Whether 1,990–2,025 MHz is allocated to MSS, reallocated in part to MSS and in part to 3G, or reallocated to some other use, the bedrock principal remains that broadcasters must be "made whole" by any newcomer(s). The Commission's own language demands that broadcasters' ENG ability must not be in any way diminished. As SBE has pointed out in its comments many times, broadcasters use the 2 GHz TV BAS band to bring American viewers timely news, emergency, sports and other programming. There should be no doubt that the 2 GHz BAS band plays a critical role in the American system of free over-the-air broadcasting. The concept of being "made whole" carries with it an implicit duty not to cripple. Broadcasters must remain technically enabled to meet their public interest obligations by bringing timely information on breaking news stories, including natural and man-made disasters, and terrorist events.

15. In the event that additional players are to share the benefits of the re-allocated of the bottom 35 MHz of the 2 GHz TV BAS band, SBE is concerned about how responsibility for compensating hardware or payments to broadcasters will be ensured. The last thing broadcasters need is finger-pointing between MSS, 3G, or other benefiting parties over who gets stuck with the bill, or how the bill should be split. The Commission must adopt a mechanism that will ensure that broadcasters end up receiving compensation from the benefiting parties. If former TV BAS Channel A1 (1,990–2,008 MHz) is allocated to MSS, and if former TV BAS Channel A2 (2,008–2,025 MHz) is allocated to 3G or other users, SBE is concerned that MSS may argue that its taking of 18 MHz of 2 GHz TV BAS spectrum, by itself, did not force broadcasters to digital ENG, and that 3G (or whatever) may argue that its taking of the remaining 17 MHz of re-allocated 2 GHz TV BAS spectrum, by itself, also did not force broadcasters to digital ENG, and therefore that neither group should have to pay the higher equipment costs (because now new transmitters will be required instead of just new receivers) involved in converting broadcasters from 17-MHz wide analog to 12.1-MHz wide digital. In other words, the Commission must consider the combined impact of IB Docket 01-185 (terrestrial MSS) and the ET Docket 00-258 FNPRM (3G) rulemakings.

IV. Interference from Terrestrial Based MSS to BAS

16. Paragraph 10 of the NPRM makes it very clear that New ICO is targeting terrestrial base station transmitters in urban areas— exactly where TV BAS use is the highest. This will maximize TV BAS–MSS inter-service interference. If the Commission nevertheless proceeds with this inappropriate proposal, SBE questions whether two of the four proposed terrestrial modes will even work because of self-interference between MSS transmitters and MSS receivers, especially hand-held units. SBE suspects that even if MSS had the entire 1,990–2,008 MHz portion available to a single user, there would still be insufficient frequency separation to avoid self-interference. SBE is using as a working assumption that 18 MHz separation at 2,000 MHz (compared to 45 MHz separation at 890 MHz for cellular) would mean that MSS telephones would have to be designed around a custom duplexer capable of operating with such a small frequency separation. An 18-MHz separation at 2,000 MHz would likely require a duplexer whose size and cost would result in yet another Iridium-style “brick” telephone that would not be greeted with joy and acceptance by users.

17. SBE further questions the Appendix B transmit power calculations for MSS portable telephones for terrestrial versus satellite based communications. SBE believes that there is a fundamental design difference between an antenna designed to transmit up to a satellite and one designed to transmit to a terrestrial base station. The single-antenna design would represent a sacrificial compromise for received signals: either on the satellite side or the terrestrial side. Perhaps New ICO plans to mitigate this problem by placing MSS cells much closer than conventional cellular and PCS cells, but in that event SBE suspects that such densely packed MSS terrestrial cells would make brute force overload (“BFO”) an even more serious threat to ENG receive only sites and increase their terrestrial plant’s physical size and cost geometrically.

18. As mentioned in the prior paragraph, SBE is also concerned about the interference potential from terrestrial fixed site MSS transmitters on 1,990–2,008 MHz. This proposal will cause BFO to the many ENG receive-only sites that broadcasters have established in the larger metro areas of the United States. As SBE has stated before, multiple ENG receive sites are an integral part, if not the *sine qua non*, of frequency reuse that makes possible real-time ENG coordination. These sites are typically on tall buildings, mountain tops, or tall towers and often use remotely controlled steerable receiving antennas, sometimes with feed horn-mounted preamplifiers. A system of terrestrial MSS cell sites in the same large metro areas having ENG receive-only sites represents a far more serious interference threat to

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2 GHz BAS operations. Portable MSS telephones are not as much of a BFO threat to these ENG receive-only sites, because of their limited power, mobile nature, and low duty cycle. In contrast, terrestrial MSS cell sites would be fixed, would have higher power, and would have a high duty cycle, and would be an interference threat.

19. This is not idle speculation on SBE's part. The building of PCS cell sites in the 1,850–1,990 PCS band and especially in the 1,975–1,990 MHz C Block, which is immediately adjacent to existing TV BAS Channel A1 at 1,990–2,008 MHz, have caused serious BFO problems to ENG receive only sites; indeed, one company, Phillips Microtechnology, Inc. ("PMI") of Ft. Lauderdale, Florida, has developed an entire line of retrofits needed for even current technology Microwave Radio Corporation ("MRC") "Millennium" ENG radios to deal with the PCS BFO problem. These fixes include state of the art band pass, high pass, and PCS band reject filters, and improved intermediate frequency ("IF") modules using surface acoustic wave ("SAW") filters to get IF rejections of 60 dB or better. Nevertheless, the PMI web page, <http://www.tvtower.com>, documents numerous serious interference problems caused by PCS base stations being built virtually without regard to adjacent band ENG receive only sites.

20. The only possible advantage of re-allocating the bottom 18 or 35 MHz of the 2 GHz TV BAS band to MSS would be that it would provide a 35 MHz buffer between 2 GHz ENG receive only sites and high power PCS base stations. Filling that reallocated spectrum with low power and mobile MSS telephones will pose little or no risk of BFO to 2 GHz TV BAS receivers. But if terrestrial MSS cell sites will be allowed all that would change. The Commission would be once again be placing high powered stations with EIRPs of up to 1,610 watts, or 62.1 dBm, immediately adjacent to systems with receiver sensitivities of around -87 dBm. This would fly in the face of good engineering practice, let alone good spectrum policy.

21. SBE feels compelled to plan for the worst, and provide engineering boundaries that would make the best of what it hopes the FCC understands is a bad situation. Accordingly, if terrestrial MSS is to be allowed, MSS base stations should not be permitted within 4.7 kilometers of a 2 GHz ENG receive-only site, and should be required to demonstrate protection of all nearby receive sites of existing fixed, point-to-point 2 GHz TV BAS links. Although fixed links generally do not use preamplifiers and use more directive, and fixed, parabolic receiving antennas, such antennas can have much higher gains (up to 45 dBi or so). Therefore even fixed point-to-point receivers need to be checked for BFO, although allowance

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for any off-axis receiving antenna rejection that may apply can certainly be made. An MSS terrestrial station should not be allowed where it would result in a receive carrier level ("RCL") in excess of -30 dBm, or unless the MSS base station licensees first agree as a condition of license to provide an appropriate bandpass or band reject filter. For ENG receive only sites with a steerable dish, a 4.7-kilometer preclusion distance for the placement of terrestrial MSS cells operating anywhere in the 1,990–2,025 MHz band is needed to ensure that BFO is not caused to a broadcaster's ENG receiver, since a steerable ENG receive-only antenna means that the receiving dish's orientation is variable. Consequently, no allowance for receiving antenna directionality should be allowed for ENG receive-only sites with steerable antennas. SBE must assume that the steerable ENG receive-only dish is aimed directly at the terrestrial MSS site and ask for protection for this worst case. If one assumes 1,610 Watts (62.1 dBm) EIRP for a terrestrial MSS site, the same EIRP as allowed for broadband PCS base stations,⁴ a -30 dBm BFO signal level for an ENG preamplifier, and a 20 dBi gain steerable dish, a keep-away distance of 4.7 kilometers is indicated to ensure that a 1,990–2,025 MHz terrestrial MSS transmitter does not cause BFO. If the even higher power of 3,500 Watts (65.4 dBm) EIRP allowed for narrow band PCS base stations is assumed,⁵ then the keep-away distance increases to 6.9 kilometers. If the maximum MSS based station power turns out to be the 501 Watts (57 dBm) EIRP shown in Table 4 of Appendix B to the March 8, 2001, New ICO letter, then the keep-away distance reduces to 2.6 kilometers.

22. Of course, the best and most obvious solution for ensuring that terrestrial MSS fixed transmitters do not cause BFO interference to ENG receive-only sites is to simply require MSS to build the system that was originally proposed: namely, Earth-to-space uplinking using only low-power, portable telephones.

23. With regard to adjacent-channel interference to TV BAS operations on re-farmed Channel A1 (2,025.0–2,037.5 MHz if Phase I, 2025.0–2,037.4 MHz if Phase II), the requirement should be that adjacent-channel emissions be 3 dB below the effective noise floor of the 2 GHz TV BAS receiver: this would be approximately -90 dBm for both analog and digital radios.

24. SBE is not convinced that the claim at Page 23 of Appendix B to the March 8, 2001, New ICO proposal for terrestrial MSS regarding adjacent band interference is valid. New ICO claims that no additional adjacent band interference burden would be created to what

⁴ Section 24.232(a) of the FCC Rules.

⁵ Section 24.132(d)(1) of the FCC Rules.

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New ICO calls services "operating outside of the MSS Bands, or "OOMSSB." But this conclusion is based on the assumption of at least 25 dB of elevation pattern discrimination by the transmitting antenna of terrestrial MSS base stations. That is, New ICO is assuming that an OOMSSB victim receiver will always be located at an angle "well above the horizon" from the terrestrial MSS base station transmitting antenna. Given the variations in height that terrestrial base stations can have, and the mobile and itinerant nature of TV Pickup receivers used by broadcasters, SBE believes that there is no reason to assume at least 25 dB of elevation pattern discrimination. If 25 dB of elevation pattern discrimination does not exist, then instead of having 13.5 dB less adjacent band interference potential than MDS return channels in the 2,150–2,162 MHz band, terrestrial MSS base stations would represent an 11.5 dB greater threat. This is more than an order of magnitude greater interference threat than claimed by New ICO.

III. Impact to 2.5 GHz TV BAS, TVDL, and ITFS/MMDS

25. Paragraph 83 of the NPRM discusses allowing Big LEO⁶ to also use terrestrial facilities. The space-to-Earth frequencies for Big LEO are identical to former ENG Channel A10, 2,483.5–2,500 MHz. This band is used by TV Pickup stations operating on a grandfathered basis. High powered based stations at 2,483.5–2,500 MHz for Big LEO with a terrestrial component would represent a BFO interference threat to ENG Channel A8 (2,450–2,467 MHz) and would represent both a BFO and an adjacent-channel interference threat to ENG Channel A9 (2,467–2,483.5 MHz). Yet the 2.5 GHz TV BAS band is exactly where the Commission suggests itinerant TV BAS users (*e.g.*, network sports) operate while the 2 GHz TV BAS band is being refarmed to narrower channels pursuant to the ET Docket 95-18 rulemaking. Channels A8 and A9 are also shared with public safety users for tactical video downlink ("TVDL") uses. Finally, a terrestrial Big LEO component would be an adjacent-channel interference threat to ITFS Channel A1 (2,500–2,506 MHz) and a BFO interference threat to the entire 2,500–2,686 MHz ITFS/MMDS band. This is a bad idea and should not be adopted.

⁶ The "Big LEO" bands are 1,610–1,626.5 MHz for Earth-to-Space and 2,483.5–2,500 MHz for space-to-Earth.

IV. Summary

26. SBE concludes there is no need for terrestrial MSS; existing cellular and PCS sites already provide good to excellent coverage. Cosmetics for pigs, guild for lilies, or sleight of hand should never substitute for good engineering, good economic practice, and common sense. Even if there were a need for a third terrestrial cellular radio service, the Commission is obligated under the Communications Act to auction such spectrum, and not give New ICO or any other MSS entity a windfall allocation for free and potentially penalize existing operators. The present 2-year mandatory negotiation period and the 10-year reimbursement period must be placed on-hold or restarted. Finally, in the event that terrestrial MSS prevails in their desperate tactics, terrestrial MSS base stations must be required to protect adjacent-band

2 GHz TV BAS receivers from BFO, and must be required to protect adjacent-channel 2 GHz TV BAS receivers from out of band, spurious, emissions.

Respectfully submitted,

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